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Technical Bulletins: General Outline of Requirements for Public Fire Protection (For Incorporated Municipalities or Utility Districts of Less than 2500 Population to Obtain Eighth Class Grading)

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technical bulletin

Municipal Technical Advisory Service
Institute for Public Service, The University of Tennessee
in cooperation with the Tennessee Municipal League

August 15, 1973

GENERAL OUTLINE OF REQUIREMENTS FOR PUBLIC FIRE PROTECTION (For Incorporated Municipalities or Utility Districts of Less Than 2500 Population to Obtain Eighth Class Grading)

MTAS is reproducing for your information these guidelines just prepared by the Insurance Services Office of Tennessee. The material in this bulletin supersedes that prepared in March 1972. The outline, in its entirety and exactly as issued by the ISO, follows:

The following requirements are intended only as a general guide for small incorporated municipalities or utility districts contemplating the installation of water works systems and other public fire protection facilities, with a view to obtaining credit in fire insurance rates.

The state laws of Tennessee require that all public water works installation costing in excess of \$5,000.00 shall be supervised by an engineer holding a license from the State to practice his profession in Tennessee. Consequently, the first step is to secure the services of a licensed engineer who specializes in this type of work. The engineer should submit his plans to the Insurance Services Office for review before proceeding with the actual installation, in order that the town may know if the water works plans, in conjunction with a suitable fire department, fire alarm and building ordinances, will obtain a satisfactory reduction in fire insurance rates. As soon as the construction of the water works has begun, the town should organize a fire department, provide suitable fire fighting equipment and fire alarm, and adopt suitable building and fire prevention ordinances, so that the entire scheme of fire protection may be inspected and graded at the time the water works is completed.

WATER WORKS

Water Supply: The supply shall be adequate at all seasons of the year, and in no case should it be less than 250 gallons per minute. If the supply is from wells, there should be at least two wells. A master meter should be provided so that the amount of water pumped each day can be recorded.

Elevated Storage: Elevated reservoirs or tanks lessen the requirements for supply, filters, and pumping equipment, hence the elevated storage should be as large as possible. The capacity of the elevated storage should never be smaller than 100,000 gallons. Whenever possible, the elevated storage should be on the opposite side of town from the pumping station or source of supply.

Pressure: The height of the elevated storage, pressure developed by pumping equipment, and the size of supply mains should be such that the following fire

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flow (in addition to domestic consumption) can be delivered for at least two (2) hours in the mercantile or other high value districts at a residual pressure of not less than 20 pounds. Static pressure should be at least 60 pounds.

An estimate of the fire flow required for a given fire area may be determined by the formula:

$$F = 18 C (A)^{0.5}$$

where

F = the required fire flow in gpm

C = coefficient related to the type of construction

C = 1.5 for wood frame construction

= 1.0 for ordinary construction

= 0.8 for noncombustible construction

= 0.6 for fire-resistive construction

Note: For types of construction that do not fall within the categories given, use a coefficient reflecting the differences. Such coefficients shall not be greater than 1.5 nor less than 0.6 and may be determined by interpolation.

A = the total floor area (including all stories, but excluding basements) in the building being considered. For fire-resistive buildings consider the 6 largest successive floor areas if the vertical openings are unprotected; if the vertical openings are properly protected, consider only the 3 largest successive floor areas.

Note: In residential sections, or where buildings are chiefly one or two stories in height, there shall be available at each fire hydrant not less than 500 g.p.m. at 20 pounds residual pressure.

Pumping Equipment: No general rule can be given for the size and other feature of the pumping equipment, as this will have to be determined by consulting engineers for each individual town. Pumping equipment should be in duplicate and arranged so that the total pumping capacity may be available simultaneously. Pumping station should be unexposed and contain as little combustible material as possible, and should be heated in cold weather, or insulated, to prevent damage from freezing.

Water Mains: Mains serving fire hydrants should be 6-inch or larger. Mains should have 30 inches cover to protect against freezing and traffic damage.

Gate Valves: All mains in the underground distribution system should be gated at each point of connection with a larger main, and additional gate valves should be strategically located on each size main so that not more than two fire hydrants will be controlled by one group of valves. Preferably, gate valves should be sufficient in number to insure that no single case of breakage or repair will necessitate cutting out more than 500 feet of pipe in the mercantile district, or 800 feet in the residential sections. Care must be taken to see that valve box covers are maintained at street level when streets are graded or re-surfaced.

Fire Hydrants: These should be of American Water Works Association standard type, having not less than two 2½-inch outlets and with National Standard Threads, i.e., 7½ threads per inch, and 3 1/16-inch outside diameter. All hydrants in

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the mercantile and manufacturing sections should also have a large suction outlet. Hydrants should be set so that outlets are not less than 18 inches above the ground, and so turned as to be unobstructed by poles or other objects. Hydrants should be spaced 300 to 400 feet apart in the high value sections, and 500 to 600 feet in the residential sections. Full credit will not be given to buildings of other than the dwelling class, where situated over 300 feet from a hydrant; measurements to be taken to middle of rear wall of building along a public thoroughfare, and not across vacant lots. Connection between street main and hydrant shall be 6-inch where the street main is 6-inch or larger. Where hydrants are connected to an 6-inch or larger mains, gate valves should be provided in the hydrant connections. Hydrants should be flushed and inspected not less than two (2) times a year, also they should be examined after use at each fire in freezing weather, and daily in high value sections during protracted periods of severe cold.

Map and Records: When the installation is completed, the engineer should furnish the town and the Insurance Services Office with a correct map showing the water mains, valves, hydrants, etc. The town should keep its copy of the map corrected as changes in the system are made. Records should be kept of all consumption, hours of pumping, pressures, repairs, hydrant and valve inspections and all phases of water department operations.

FIRE DEPARTMENT

Organization: A fire department must be organized by municipal ordinance or by resolution in utility districts and should consist of 15 members, including a chief and assistant chief. In small towns, the department may be volunteer, but it is generally necessary to pay the members a nominal sum in order to maintain an efficient organization. The members of the department should be drilled twice a month in the proper use of the equipment. Rules and regulations governing fire department matters should be adopted, and the chief given full authority for rigid enforcement. (Suggested regulations will be furnished by this office on request).

Apparatus: An approved fire department pumper, with a pumping capacity of not less than 750 G.P.M. (in most cases a capacity of 1000 G.P.M. is preferable); should be provided. It should meet the suggested specifications of the National Fire Protection Association and the International Association of Fire Chiefs; it should be of a model which has been certified by the Underwriters' Laboratories, Inc., as having passed a 3-hour acceptance test witnessed by a representative of the Underwriters' Laboratories. In addition to the pump, the apparatus should have the following equipment as a minimum: hose body with a capacity for not less than 1200 feet of 2½-inch and 400 feet of 1½-inch, fire hose, a water tank of not less than 300 gallons capacity (preferably 500 gallons), two axes (one flat head and one fire department type), one pike pole, one 14-foot roof ladder, one 24-foot extension ladder, one 30-inch claw tool, one 36-inch crowbar, 20 feet of hard suction hose and strainer, one set of double connections for 2½-inch hose, suction adapters for each size hydrant outlet, two electric hand lanterns, two approved type portable fire extinguishers, 200 feet of 1-inch booster hose with a combination fog-straight stream nozzle, two shut-off nozzles for 2½-inch hose, with several extra tips ranging from 1-inch to 1½-inch, two combination fog-straight stream nozzles for 2½-inch and two for 1½-inch hose, six hose coupling spanners, two hydrant wrenches, two Bureau of Mines approved self-contained breathing mask, six hose straps, two salvage covers (size 12' x 18'), one 2½ x 1½ x ½" gated wye, one 2½-inch distributing nozzle. Required apparatus must not respond outside the city limits.

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Hose: There should be provided, in towns up to 1500 population, not less than 1800 feet of standard 2½-inch fabric covered rubber-lined hose made for public fire department use. Larger towns should have 2400 feet or more. Cheap hose is unsatisfactory and unreliable, and it will be found more economical in the long run to purchase a good grade of hose. Hose ordinarily cannot be depended upon after five or six years of use. Therefore, each year it will be necessary to purchase 250 to 300 feet of new hose in order to keep the required amount of serviceable hose on hand. Hose lasts much longer if properly cared for. All hose which has not been used should have water run through it every three months to keep the rubber lining from cracking. Afterward, and after use at a fire, both the hose should be thoroughly cleaned and then dried. Hose must be tested at 250 P.S.I. each year.

Fire Station: This should be an unexposed masonry building near the mercantile district, with adequate room for the motor fire apparatus, hose drying facilities and sleeping quarters for several men. A telephone for fire alarm only with loud ringing bell, should be installed, also a switch for operating the fire alarm siren. The building should be heated in cold weather. Preferably, one or more of the firemen should sleep at the fire station, as this enables quicker response to be made to alarms at night. The apparatus should not be housed in a commercial building such as a public garage, but there is usually no objection to a combination fire station and city hall.

Records: The Fire Chief should keep complete records showing cause of fire, number and names of firemen responding, drills, method of fighting fire, loss, insurance, hose test, etc., and should make a yearly report to the Mayor and Board and to this office.

FIRE ALARM

Unless there will be someone on duty at the fire station at all times, arrangements should be made for alarms to be telephoned to some other place where there is constant attendance, and should be sounded by means of a 5-horsepower or larger electric siren, preferably by wards. This telephone and siren switch should be in addition to those provided at the fire station.

ORDINANCES

Modern building and fire prevention ordinances should be adopted and arrangements made for their enforcement. These ordinances should define the fire limits, within which only buildings having masonry walls may be erected, and should regulate roofing materials, chimney construction and similar matters.

Enact an ordinance adopting a house numbering system in cooperation with Post Office officials. Rate credit will be contingent upon such numbers being posted upon building entrances.

INSPECTIONS

After a town has installed public protection, it will be visited approximately once a year by a representative of this office to determine if the protection is being kept up to standard. On such inspections the town may be required to call the fire department together for drill or instruction, or the water works department required to cooperate in making certain pressure tests. After the inspection, recommendation will be made to the town officials in order to bring the protection up to standard, or to provide better protection to care for future growth.